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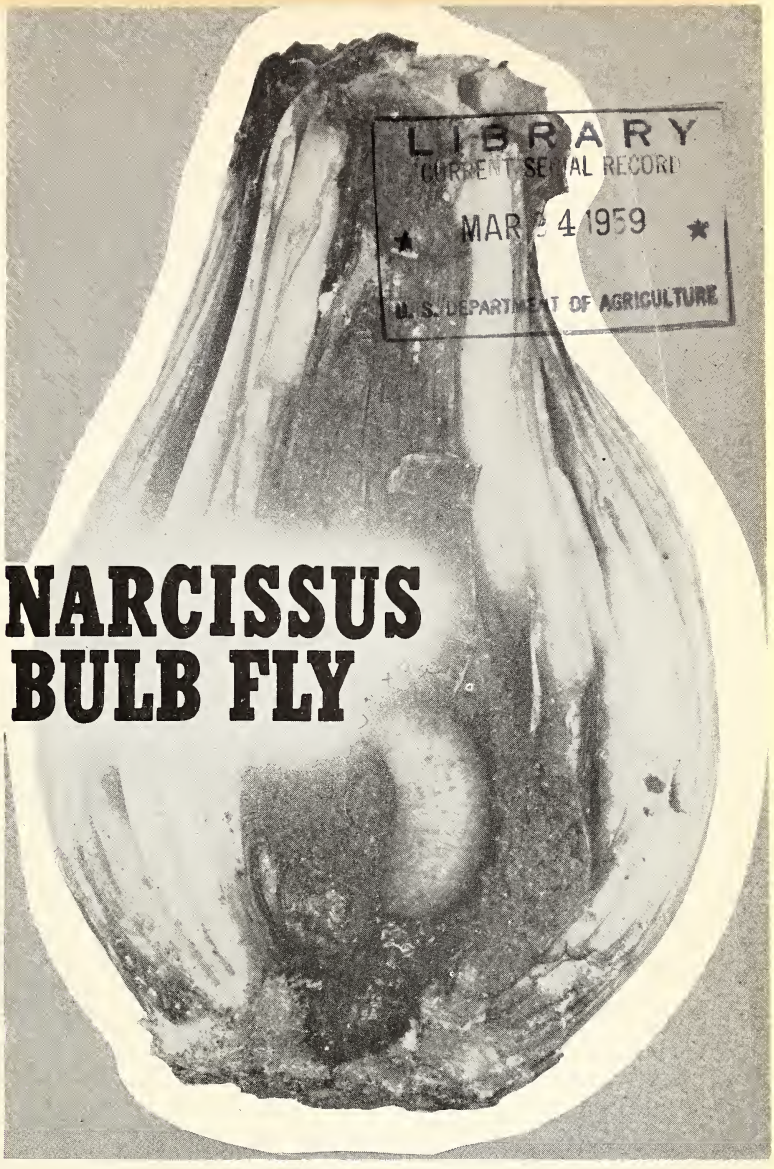

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the NARCISSUS BULB FLY

how to prevent its damage in home gardens

LEAFLET NO. 444

U.S. DEPARTMENT OF AGRICULTURE

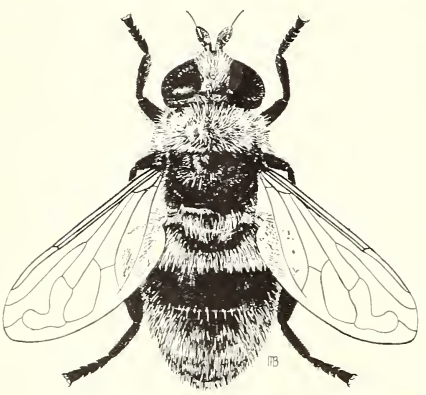
the NARCISSUS BULB FLY

how to prevent its damage in home gardens

By C. F. Doucette, entomologist, *Entomology Research Division, Agricultural Research Service*

The narcissus bulb fly [1] probably occurs wherever narcissus bulbs are grown in the United States. It may infest 20 to 30 percent of the bulbs in commercial plantings, and 50 to 75 percent of those in garden plantings.

This fly resembles a small bumble bee in color and general appearance.



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Adult female narcissus bulb fly.

DAMAGE TO BULBS

The female flies lay eggs on narcissus leaves. The larvae that hatch from these eggs migrate down the plants to the roots. They first feed on the basal plate, or growth center, of the bulb. Later they eat large cavities in the centers of the bulbs.

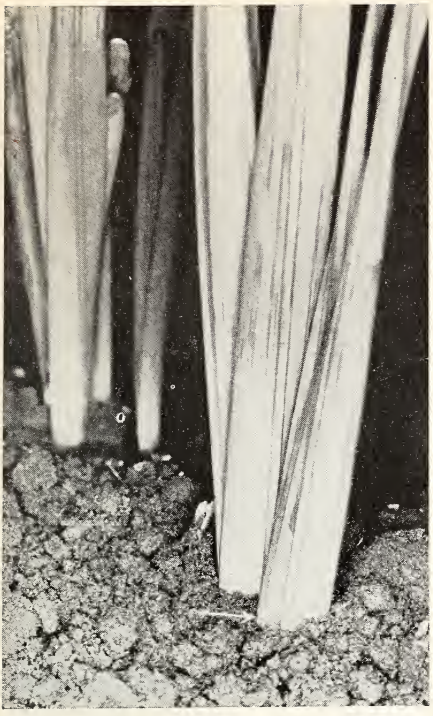
[1] *Lampetia equestris.*

When the basal plate tissue is damaged, the bulb may be killed or its growth may be retarded. Small bulbs usually die. In large ones, enough base is left uninjured to allow some growth, but this tissue does not become normal again for 2 or 3 years. If the central area of the basal plate is destroyed, several small bulbs may develop around the undamaged edges. These bulbs take at least 2 years to reach normal size.

Injured bulbs produce only a small amount of foliage—often just a single leaf. This is the result of infestation the previous season.

SIGNS OF INFESTATION

You can detect infested bulbs by examining the bases of bulbs during the summer months when they are out of the ground. Clean the soil and old roots away from the base with a knife or a small, stiff brush. A sunken brown area in the normally white root ring, at the edge of the basal plate, indicates that it has been attacked by a narcissus bulb fly maggot. Cut the brown spot out with a knife and you will see discoloration extending up the side and into the bulb.



BN-6017

An egg of the narcissus bulb fly on a narcissus leaf just above the surface of the ground.

HOW THE FLY DEVELOPS

The narcissus bulb fly has four life stages—egg, larva (or maggot), pupa, and adult. There is normally one generation a year.

Egg

The eggs are chalk-white, elongate oval, and about $\frac{1}{16}$ inch long. They can be seen on the leaves near the base of the plant, or in the soil.

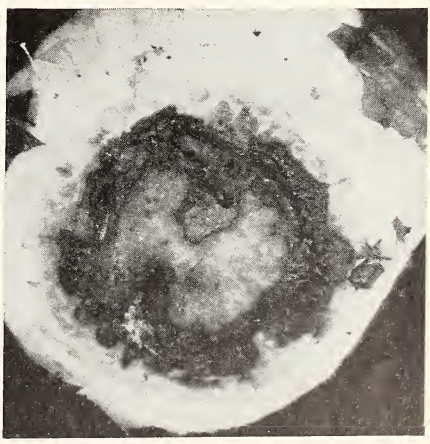
Larva

The eggs hatch in about 10 days. When newly hatched, the larvae are about $\frac{1}{15}$ inch long. They wriggle down through the soil at once, enter the bulbs through or near the roots, and develop during the summer and fall.

Usually only one larva is found in a bulb. Occasionally a larva will consume all the inside of the bulb before reaching maturity. It may then leave that bulb and crawl through the soil in search of another one in which to complete its development.

While inside the bulb, the larva passes through three stages of development. In the first one, which lasts several weeks, it tunnels back and forth in the base of the bulb. In the second and third stages, the larva moves upward into the center of the bulb, enlarging the cavity as it grows. The mature larva remains inactive in the hollowed bulb through the winter.

Each larva sheds its skin twice as it develops. Larvae are about $\frac{3}{4}$ inch long when fully grown. The dirty-tan body is plump, slightly arched, and nearly circular in cross section. It has a tough, wrinkled skin. The breathing tube at the hind end is almost black. Black mouth hooks in the slightly tapered head are used to tear bulb tissue. The larva contracts its body when it is



BN-4969

Feeding tunnels in basal plate of a narcissus bulb.

handled; if its mouth hooks are touched it quickly draws them in almost out of sight.

Occasionally a larva may be retarded in development and remain small during the summer and fall. The next spring it will resume growing and will pass its second winter as a fully developed larva.

Pupa

In early spring the larva leaves the bulb and moves near the surface of the soil. Its skin hardens and darkens, and the ends of its body become rounded. This larval skin becomes the pupal case, or puparium, within which the larva transforms into the pupa. Its tip barely shows above the surface of the soil.

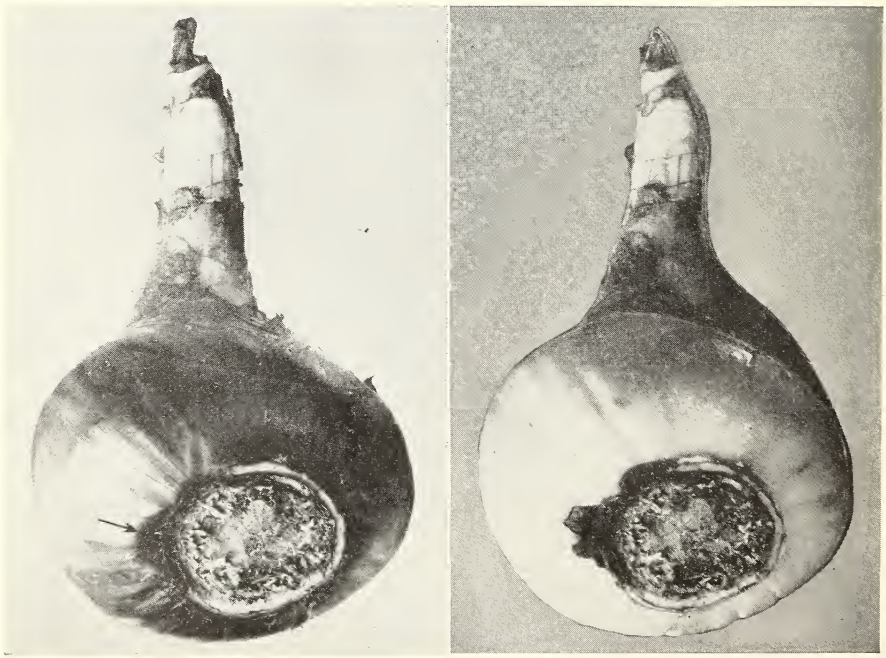
Several days after the start of the pupal stage, two breathing tubes resembling horns emerge on the upper side of the puparium toward the front.

The larva changes to the adult fly during the pupal stage. When it is ready to emerge, the fly pushes off the cap of the puparium, wriggles out, and climbs a nearby stem, where it spreads out and dries its wings.

Adult

The adult is about ½ inch long. Its black body is covered with bands of long, colored hairs. These bands appear in combinations of black, yellow, orange, and buff, and give the flies many variations in color pattern.

The adults appear in late April, May, June, and early July, and are most



BN—4971, BN—4972

Left: Dark, sunken part of the edge of the basal plate of a narcissus bulb indicates that the bulb is infested. Right: The same bulb with outer dried scales removed shows that discoloration extends into the living scale tissue.

BN—6019, BN—6018

Two stages in the destruction of a bulb by the narcissus bulb fly. Left: The basal part of the bulb has been seriously injured by the feeding of a maggot in its early stages. Right: A large part of the bulb has been eaten out by the maggot, which is now full grown.

BN—4970

Single leaves usually indicate that the bulbs from which they are developing have been practically destroyed by narcissus bulb fly maggots.

BN—3236X

Soil has been removed to reveal puparia of the narcissus bulb fly just below the surface of the ground.

active on warm, sunny days. They fly in a zigzag fashion along rows of plants or among leaves, 8 to 10 inches above the ground, and produce a peculiar, high-pitched hum. Since the flies prefer protected places, they usually do not lay their eggs on narcissus plantings in open, windswept areas.

The flies feed on pollen and nectar from the blossoms of numerous fruits and flowers, including strawberry, apple, morning-glory, buttercup, and dandelion. The flies move back and forth between their food plants and the nearby narcissus plantings.

Egg laying starts about a week after the adults emerge from the puparia and reaches its peak late in May. Each female lays 50 to 75 eggs singly on narcissus leaves at the ground level or as far below this level as she can. Occasionally eggs are deposited in the soil near the leaves.

HOW TO PROTECT BULBS

Before planting

The best way to keep this insect from damaging narcissus bulbs is to treat the bulbs before you plant them. Dust the bulbs with an insecticide or soak them in an insecticide emulsion. The insecticide does not kill bulb fly larvae that are inside the bulbs, but it keeps newly hatched larvae from entering them.

Either the dusting or the soaking will protect bulbs from attack by the narcissus bulb fly for two growing seasons, if the bulbs are left in the ground.

DUSTING BULBS.—Just before you plant a furrow or a bed, dust the soil lightly with an insecticide. Then put the bulbs in the soil and shake dust over them. Apply one of these dusts: 2.5-percent heptachlor, 2.5-percent aldrin, 5-percent chlordane, or 1.5-per-

cent dieldrin. Shake the dust from a mason jar that has holes punched in its lid. A pound of dust will treat about 200 bulbs, or 50 feet of row. When you have dusted the bulbs thoroughly, cover them with soil.

SOAKING BULBS.—To prepare an insecticide emulsion, mix water with one of the emulsifiable concentrates listed in the accompanying table. If you buy an emulsifiable concentrate that contains a different percentage of the insecticide, use proportionately more or less of it.

Guide for preparing emulsion

Emulsifiable concentrate (purchased product)	Amount to mix with—	
	25 gallons of water	1 gallon of water
	Pints	*Teaspoons*
Heptachlor, 25 percent	1	4
Aldrin, 25 percent	2	8
Chlordane, 75 percent	1	4
Dieldrin, 15 percent	½	2

BN—6172

Bulbs being dusted with insecticide before being covered with soil.

To prevent the spread of fungus diseases, add a fungicide to the emulsion. Formaldehyde is effective when it is used at the rate of 1 pint per 25 gallons, or 4 teaspoons per gallon.

You can treat 40 to 50 bulbs at a time in a gallon of emulsion. Put the bulbs in an open-weave bag and soak them for at least 10 minutes, but not more than an hour. If you are not going to plant the bulbs for a day or two, dry them carefully after you have taken them from the emulsion.

The number of lots that you dip will not weaken the emulsion. However, when about one-third of the emulsion has been used and soil and debris have accumulated in the emulsion, make a fresh batch.

After planting

Use naphthalene flakes ("moth flakes") to protect growing but untreated bulbs from this insect. When the flies start laying eggs in late April or May, apply flakes to the soil around the bases of the plants; do this again 2 weeks later. Cover the flakes with a mound of soil after each application. A pound of flakes will treat about 75 feet of row, or about 300 bulbs.

You also may protect your plants with a soil drench of aldrin or heptachlor emulsion prepared as for soaking the bulbs. When adults appear in the spring, apply 2 gallons of either emulsion to 15 feet of row or to 15 square feet of bed surface. Use a sprinkling can or sprayer with nozzle removed and direct the material to the base of the plants. Do not mound the soil after treatment.

PRECAUTIONS

The insecticides and fungicide mentioned in this leaflet are poisons. Store them where children and pets cannot reach them. Handle them with care. Follow the directions and heed all precautions on the container label.

Avoid getting them on the skin and keep them away from your eyes, nose, and mouth.

Avoid inhaling the vapors of formaldehyde.

The insecticide concentrates may be absorbed through the skin. Wear rubber gloves when measuring and pouring them.

After handling the chemicals or treated bulbs, wash your hands thoroughly with soap and water.

After you apply an insecticide dust, bathe thoroughly and change to clean clothing.

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